Ontario

Ministry of
Health and Long-Term Care

PHERO

Public Health and
Epidemiology Report Ontario

Volume 15, Number 2 www.health.gov.on.ca Feb.-Mar.-Apr. 2004

IN THIS ISSUE

The Public Health and Epidemiology Report Ontario is published by the:
Public Health Division
Ministry of Health and Long-Term Care
8th Floor, 5700 Yonge Street,
Toronto, Ontario, M2M 4K5

email: phero@moh.gov.on.ca

Editorial Board: K. Kurji, G. Kettel, E. Chan, H. Brown, R. Jin, K. Barker
Editor: M. Watkin

The contribution of scientific articles by the staff of local Boards of Health is invited. Address all inquiries and submissions to the Editor.

ISSN 1181-960X

Using Provincial Client Registries For Selection of Control Subjects: Lessons Learned

Case-control studies are frequently employed in epidemiologic research to examine postulated risk factor exposures in individuals with the disease of interest (cases) and those without the disease (controls). Developing a scientifically sound and cost-effective method for identifying and enrolling control subjects is a critical and challenging aspect of case-control study design. Control subjects should be selected independently of their exposure status to avoid and/or minimize bias as much as possible and ideally should be selected from the same source population as cases.[1,2] They can also be matched with cases on variables such as age, sex, and race, which might otherwise confound the relation between outcome and exposure variables,[3-5] however, care should be taken to avoid overmatching, which may partially or completely obscure evidence of a true causal association.

Historically, control subjects in case-control studies have been selected from a variety of sources, including hospitals, clinics, the neighbourhood, friends, or relatives.[1,6] They can be selected by systematic, convenience, or random sampling of the source population.[1] These sources of control subjects and selection strategies are not without limitations. For example, responses of control subjects who are friends or relatives of a case could introduce bias because of their knowledge of the case's illness, and hospital- or clinic-based control subjects may be unrepresentative of the exposure distribution in the source population.[1,6]

Random digit dialing (RDD) and telephone directories may be used to select control subjects for telephone interviews. RDD frequently yields not-in-service or non-residential telephone numbers, and telephone directories may be out of date, have more than one telephone number per household, or not include unlisted telephone numbers. Both techniques usually entail numerous telephone calls in order to reach willing subjects in the desired age and sex groups,[1,6] and this may be particularly problematic in studies that require rapid enrolment of controls.

An alternative method of identifying matched healthy control subjects was successfully used in a recent outbreak investigation in British Columbia.[7] Control subjects were randomly selected from a provincial, population-based health care client registry.

This article outlines how client registries in British Columbia, Alberta, Saskatchewan, and Ontario were employed to generate age-matched control subjects for a 12-month, multi-provincial prospective case-control study of *Salmonella* Typhimurium infections. The goal of the article is to provide information to enable researchers to effectively use provincial client registry databases for selection of control subjects in future epidemiologic studies.

Materials and Methods

Basic health care in Canada is provided to most residents, except military personnel and the Royal Canadian Mounted Police, through the provincial/territorial ministries of health (a mandatory requirement of the *Canada Health Act*).[8] Provincial/territorial client registry listings include the names, date of birth, sex, address, and telephone numbers for each insured resident and are periodically updated. There are some differences among provinces/territories - for example, in Ontario, newborns whose parents hold a valid health number and have completed an infant registration form are given a health number, but in British Columbia, until recently, newborns were billed on their mother's health number for the first 3 months. The methods for the multi-provincial *Salmonella* Typhimurium case-control study were jointly developed by the participating provinces and Health Canada, Foodborne, Waterborne and Zoonotic Infections Division. Rigorous efforts were made to maintain scientific comparability among provinces, although each province made minor modifications to the protocol for administrative purposes. Ethical approval for this study was obtained from the University of Guelph, Ontario, the University of Regina, Saskatchewan, and the University of British Columbia, Vancouver, British Columbia.

The study, which aimed to identify risk factors and the burden of illness associated with *S.* Typhimurium infection, consisted of telephone interviews of laboratory-confirmed cases and age-matched control subjects identified during the 1-year study period (1 December, 1999, to 30 November, 2000). An eligible case was defined as an individual residing in the study province who experienced a diarrheal illness during the study period and from whose stool sample *S.* Typhimurium was isolated by the provincial public health laboratory. For each case, an age-matched control subject was randomly selected from the provincial client registry.

Review of provincial *S.* Typhimurium case data was undertaken to determine the expected number and age-band distribution of cases.[9,10] A stratified random sample of control subjects was obtained - 10 times the expected number of cases, in order to allow for wrong numbers and nonparticipation - by the corresponding participating provincial public health authority.

Control subjects were matched with cases by age band (Table 1) in all provinces except one, where the database format required that they be matched to cases by exact date of birth. Age band 1, which consisted of newborns 0 to 5 months of age, was re-sampled in two provinces to replace infants who had left this age category during the study. Newborn control subjects who had not previously been included in the study ("unused") were promoted to age band 2 upon reaching 6 months of age, and the list was re-randomized.

Two provinces sent information letters to potential control subjects (or parents/guardians in the case of children) before the study began and again when the number of unused control subjects in any age group became too few to meet the requirements of the study protocol. Control subjects were excluded if they were unable to communicate in English, could not be reached by telephone after six attempts (over 2 days, including evenings), or if they reported having diarrhea in the 28 days before the interview. If the first control subject was ineligible, a second was obtained from the database and six attempts were again made to contact the individual. This procedure was repeated until either a control subject had been reached or 7 days had passed since the case interview, and then the case was removed from the study.

Trained interviewers conducted all interviews in each province using scripted questionnaires and an interviewer's manual to facilitate consistent data collection. Introductory scripts specifically created for three age groups (< 12 years of age, 12 to 17, and >= 18) provided a description of the study and the anticipated interview length (25 minutes), and requested consent to participate.

Interviewers documented the outcome of each call attempt on a standardized call record form. Information collected on the call record form included telephone number, date, call outcome (i.e. busy, no answer, answering machine, subject not at home, and misconnects*) and willingness to participate. These data were entered into Microsoft Excel 2000, categorized by province, and analyzed descriptively using Microsoft Excel 2000 and SAS version 6. Saskatchewan was not included in the analysis because of small numbers; the remaining three provinces (British Columbia, Alberta, and Ontario) were randomly denoted Province I, II, and III.

Results

Participation Rates

Participation rates overall and for each province are presented in Tables 1 and 2. A total of 572 clients were reached and, of these, 378 (66%) agreed to participate. Participation rates varied by age band: overall rates for age bands 1, 8 and 10 were low (< 52%), whereas in age bands 2 and 4 they were higher (> 85%). Province I had the highest rate of participation, 83.4%, followed by province III, at 59.2%, and province II, at 51.9%. The mean number of telephone numbers used and total telephone calls made to contact a willing participant also varied among provinces, provinces I, II, and III requiring 3.8, 6.9, and 3.3 telephone numbers and 6.8, 10.2, and 5.9 telephone calls respectively.

Age bands 2 and 4 showed relatively high participation rates in all three provinces, but participation in the other age bands tended to be lower overall.

Proportion of In-service Residential Telephone Numbers

In all provinces, for the 1788 telephone numbers tried, 2813 telephone calls (1.6 calls/number) were made. Of the 1788 numbers, 1433 (80.1%) were in-service residential numbers, and the remainder (355, 19.8%) were misconnects. Overall, age bands 2, 11, and 12 displayed high proportions of in-service residential telephone numbers, of 90.5%, 96.6%, and 88.8% respectively. Province I had the highest proportion of in-service residential numbers (85%) followed by province II (79%) and province III (68%). In province I, there was little variation among the age bands in this respect: only one small group (age band 1) had < 79% in-service residential telephone numbers. In province II, the higher proportion of in-service residential numbers occurred in age bands representing those < 2 years of age (age bands 1, 2, and 3) and > 60 (age bands 11 and 12). Province III showed greater variation in the proportion of these telephone numbers among age bands than the other two provinces. As in province II, those in the lower age bands (< 4 years of age, age bands 2, 3, and 4) and the higher ones (>= 60, age bands 10 to 12) accounted for a higher proportion of in-service residential telephone numbers than those falling into the middle age band categories.

Discussion

Using provincial client registry listings as a source of population-based control subjects provides a number of advantages that other sources may not offer. First, the information in the registry may be updated after medical encounters, and this improves the efficiency of reaching potential control subjects. Second, since individual-level demographic information such as sex, age, and geographic location is available from the registry, matching control subjects with cases on these variables is a relatively quick and straightforward process. Finally, use of client registries, which are electronic data sets, makes random selection of control subjects from the same population (study base) as the cases technically simple.[5]

The overall participation rate (defined as the total number agreeing to participate/total number agreeing to participate plus the number of refusals) in our study (66%) compares favourably with published participation rates of 38% to 80.1% when RDD is used, even though our participants were informed of the expected duration of the interview.[11-13] Recruitment/information letters designed

Table 1: Participation Rates and Number of Telephone Calls Required to Recruit Healthy Controls in All Provinces by Age Band

Age Band	Age Range	Number of Participants	Non-Participants	Participation Rate [%]	Γ Numbers of Calls	Calls Per Participant
1	0-5 mo.	2	3	40.0	21	10.5
2	6-11 mo.	13	1	92.9	32	2.5
3	12-23 mo.	23	16	59.0	103	4.5
4	2-4 yr.	64	11	85.3	281	4.4
5	5-9 yr.	55	14	79.7	231	4.2
6	10-19 yr.	47	17	73.4	251	5.3
7	20-29 yr.	42	32	56.8	221	5.3
8	30-39 yr.	46	44	51.1	283	6.2
9	40-49 yr.	24	11	68.6	112	4.7
10	50-59 yr.	22	21	51.2	112	5.1
11	60-69 yr.	15	12	55.6	59	3.9
12	> 70 yr.	12	7	63.2	36	3.0
Unknown		13	5	72.2	46	3.5
Overall		**378**	**194**	**66.1**	**1,788**	**4.7**

Table 2: Participation Rates, Number and Validity of Telephone Numbers, and Calls Required to Recruit Healthy Controls by Age Band and Province

Province	Age Band	Participants	Non-participants	Participation Rate [%]	Telephone Calls Made
I	1	1	1	50.0	6
	2	9	0	100.0	25
	3	13	3	81.3	35
	4	43	6	87.8	196
	5	30	10	75.0	130
	6	20	1	95.2	74
	7	16	3	84.2	59
	8	15	2	88.2	66
	9	16	3	84.2	55
	10	12	5	70.6	46
	11	8	4	66.7	27
	12	8	1	88.9	14
	Unknown	5	0	100.0	8
	Total	**196**	**39**	**83.4**	**741**
II	1	0	1	0.0	7
	2	1	1	50.0	2
	3	8	8	50.0	57
	4	18	5	78.3	80
	5	12	2	85.7	72
	6	21	11	65.6	151
	7	20	23	46.5	138
	8	22	36	37.9	194
	9	6	4	60.0	45
	10	6	12	33.3	51
	11	4	5	44.4	25
	12	1	4	20.0	13
	Unknown	5	3	62.5	21
	Total	**124**	**115**	**51.9**	**856**
III	1	1	1	50.0	8
	2	3	0	100.0	5
	3	2	5	28.6	11
	4	3	0	100.0	5
	5	13	2	86.7	29
	6	6	5	54.5	26
	7	6	6	50.0	24
	8	9	6	60.0	23
	9	2	4	33.3	12
	10	4	4	50.0	15
	11	3	3	50.0	7
	12	3	2	60.0	9
	Unknown	3	2	60.0	17
	Total	**58**	**40**	**59.2**	**191**

*Misconnects includes wrong numbers, numbers not in service, fax, business and cell phone numbers.

†In-service residential phone number refers to those numbers successfully used to reach the person intended.

Table 2. (continued) Participation Rates, Number and Validity of Telephone Numbers, and Calls Required to Recruit Healthy Controls, by Age Band and Province

PROVINCE	Age band	Telephone numbers used per participant	No. of phone calls needed to contact a participant	Total number of misconnects*	Proportion of in-service residential phone numbers†
I	1	6.0	9	2	0.67
	2	2.8	38	3	0.88
	3	2.7	64	5	0.86
	4	4.6	271	41	0.79
	5	4.3	234	22	0.83
	6	3.7	102	10	0.86
	7	3.7	77	11	0.81
	8	4.4	102	9	0.86
	9	3.4	102	2	0.96
	10	3.8	84	5	0.89
	11	3.4	38	1	0.96
	12	1.8	20	0	1.00
	Unknown	1.6	16	1	0.88
	Total	**3.8**	**1,157**	**112**	**0.85**
II	1	0.0	9	1	0.86
	2	2.0	2	0	1.00
	3	7.1	63	9	0.84
	4	4.4	95	19	0.76
	5	6.0	92	16	0.78
	6	7.2	201	32	0.79
	7	6.9	259	30	0.78
	8	8.8	298	50	0.74
	9	7.5	66	8	0.82
	10	8.5	97	10	0.80
	11	6.3	30	0	1.00
	12	13.0	21	1	0.92
	Unknown	4.2	26	5	0.76
	Total	**6.9**	**1,259**	**181**	**0.79**
III	1	8.0	18	3	0.63
	2	1.7	15	0	1.00
	3	5.5	16	2	0.82
	4	1.7	14	1	0.80
	5	2.2	51	9	0.69
	6	4.3	54	12	0.54
	7	4.0	55	9	0.63
	8	2.6	41	7	0.70
	9	6.0	35	4	0.67
	10	3.8	35	2	0.87
	11	2.3	12	1	0.86
	12	3.0	16	3	0.67
	Unknown	5.7	35	9	0.47
	Total	**3.3**	**397**	**62**	**0.68**

*Misconnects includes wrong numbers, numbers not in service, fax, business and cell phone numbers.

†In service residential phone number refers to those numbers successfully used to reach the person intended.

for different age groups were sent out in some provinces before the study began in order to inform potential control subjects of its purpose. These letters likely had a positive effect on response rate, in that they prepared recipients for the possibility of a future telephone interview and enhanced the credibility of the study.

The results of the study suggest that those in the younger and older age bands are more likely to have correct information in the client database. This may be a result of frequent or more recent medical visits by individuals in these age bands resulting in updating of the registry. Province I had the highest proportion of in-service residential telephone numbers overall and in most age categories as compared with the other provinces. This may reflect the varying frequency and speed at which the database is updated after medical encounters among the different provinces.

The distribution of in-service residential telephone numbers varied among provinces and within each province depending upon the age band. Only one age band in one province (one participant) required more than nine telephone numbers to enroll the required participant. For future studies using client registries for the selection of control subjects, it is recommended that a sample 10 times the number needed in each age group be obtained to ensure that there are sufficient telephone numbers to enroll the required number of participants. In this study, an average of 7.5 telephone calls per participant was required; this information will assist researchers in estimating interviewers' time and monetary budgets. Some provinces charge for use of the client registry information, so this should also be included in budget considerations. Unfortunately, the sex of clients contacted and participating control subjects was not recorded on the data collection sheet; therefore it was not possible to assess whether there was a difference in response rate by sex.

There are limitations associated with the use of client registries for selection of control subjects. Registries may not include all residents in a province: military and RCMP personnel, individuals resident in the province for < 3 months or, as previously mentioned, newborns in some provinces may be excluded. Another limitation identified by some of the provinces was the delay involved in obtaining legal approval to use the registries. It may be worthwhile in future to overcome the legalities involved before beginning the study; awareness of this issue will help to plan the timing of the study.

In conclusion, using client registries to select control subjects is a valid and feasible technique that should be considered in future case-control studies in Canada.

Acknowledgement

The authors wish to thank the interviewers (in particular Michelle Cox and Gary Svoboda) for their assistance with the data collection phase of this study.

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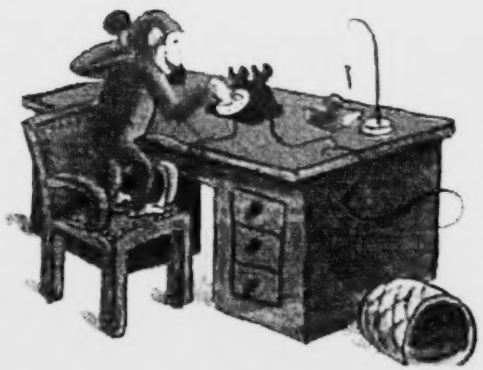
Editor's Note: With the exception of the summer months, PHERO has been habitually published on a monthly basis. However, in recent months, due to other pressing needs, it has been issued infrequently. Concerted efforts are now underway to bridge this gap. To this end, this *late winter—early spring* issue combines material originally planned for the three consecutive months February-to-April 2004. Likewise, the next issue will comprise the *late spring—early summer* edition. A sincere apology is hereby extended to our readers and contributors, along with our appreciation for your kind understanding.



Summary Report of the 2002/03 Ontario "Influenza and Respiratory Outbreak Surveillance Season"

Background

Under the *Ontario Regulation 559/91* and amendments to the Health Protection and Promotion Act, ***Respiratory Infection Outbreaks in Institutions*** were included among the specified Reportable Diseases in 2001. Starting with the 2001/02 surveillance season, all respiratory outbreaks in institutions, irrespective of the causative organisms, became reportable to the Public Health Branch (PHB) of the Ministry of Health and Long Term Care (MOHLTC), including those of unknown cause. Reporting of non-influenza respiratory outbreaks in institutions is necessary to assess the complete epidemiology of respiratory outbreaks, which is essential for adequate and timely control measures.

Data Summary

Outbreaks attributed to organisms other than influenza started later, in October 2002. Of the 160 non-influenza outbreaks that occurred during the season, 26 (16.3%) were due to respiratory syncytial virus (RSV), 20 (12.5%) due to parainfluenza virus (PIV), with the remainder caused by a combination of organisms.

During the reporting period of (week ending) November 2, 2002 and May 3, 2003, (the period during which the national and Ontario's surveillance period most closely overlapped) participating laboratories across Canada reported 3,337 laboratory-confirmed cases of influenza to the Centre for Infectious Disease Prevention and Control (CIDPC). Specifically, 57.4% (1915 cases) were influenza type A, and 42.6% (1422 cases) were influenza type B during this period. The participating laboratories in Ontario isolated or detected 892 influenza isolates of which 94.2% (840 cases) were influenza A. Of the isolates characterized, predominant circulating strains in Ontario were identified as A/(H1N2), B/Hong Kong/330/01-like, A/Panama/2007/99-like and A/New Caledonia/20/99 (H1N1)-like.

Although the Reportable Disease Information System (RDIS) collects data on influenza activity in Ontario on a year round basis, the majority of cases occur between October 1st and April 30th each year. For this reason, RDIS data is reported for this time period in the 2002/03 influenza season, as in previous seasons. Reports include information on laboratory-confirmed sporadic cases and only those outbreak-related cases that had laboratory confirmation. There were 913 confirmed influenza cases (847 influenza A, 66 influenza B) reported by health units through RDIS.

Introduction

Influenza has been a reportable disease in Ontario since 1923, and a provincial surveillance program is conducted annually from October to April. The objectives of the influenza component of the 2002/2003 influenza and respiratory outbreak surveillance season were:

- To identify the type of influenza virus circulating in Ontario, and to determine its relationship to national and international viral activity
- To monitor and conduct early detection of the antigenic shift in the circulating virus as early as possible
- To identify the incidence and prevalence of influenza in the various geographical regions of Ontario
- To determine the onset, duration, and severity of the influenza season in Ontario
- To evaluate the use and effectiveness of antiviral drugs in controlling influenza A outbreaks in long-term care facilities (LTCFs).

Respiratory infection outbreaks have been reportable since 2001. The objectives of the respiratory infection component of the 2002/03 influenza and respiratory surveillance season include:

- To assess the complete epidemiology of respiratory outbreaks in order to apply adequate and timely control measures.
- To improve the quality of diagnostic investigations, including laboratory diagnosis.
- To establish baseline morbidity and mortality data needed for the introduction of new, effective vaccines against some of the organisms responsible for respiratory outbreaks.

2002/03 was the third season for the provincial *Universal Influenza Immunization Program* (UIIP), where the entire population was eligible to receive publicly funded influenza vaccine. A continued emphasis of this program was the immunization of people at high-risk for complications associated with influenza; individuals who work in various healthcare facilities; emergency service workers; household contacts of persons at high-risk for complications from influenza; as well as those who wish to protect themselves from influenza.

Methods

The PHB of the MOHLTC uses various data sources to track influenza activity in Ontario. The five components of influenza surveillance in the 2002/03 season included the following:

1. Laboratory surveillance, conducted by the Centre for Infectious Disease Prevention and Control (CIDPC), Health Canada;

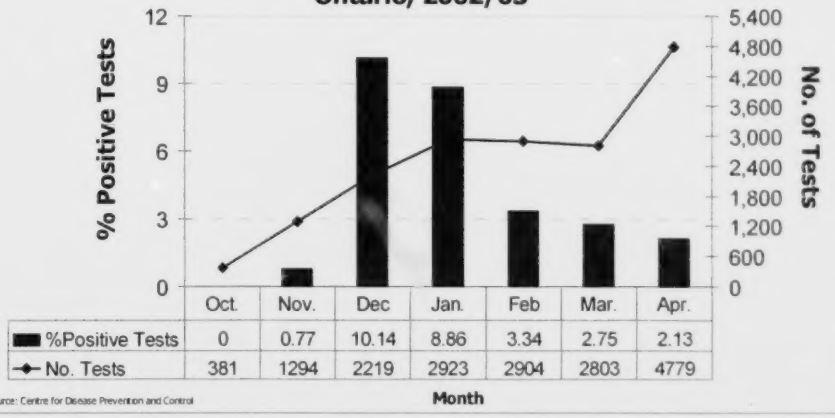
2. Reportable Disease Information System (RDIS) reporting of laboratory-confirmed influenza cases by health units across Ontario;
3. Reporting of institutional respiratory outbreaks;
4. Influenza activity level reporting by health units across Ontario;
5. Sentinel Physician Influenza Surveillance coordinated by Health Canada/College of Family Physicians of Canada (CFPC) as part of the *FluWatch* Program.

In addition to the above, data regarding vaccination rates in LTCFs and Hospitals were included.

1. Laboratory Surveillance of Influenza

The laboratory surveillance component involves the reporting of positive influenza and other respiratory virus isolates, to the Centre for Infectious Disease Prevention and Control (CIDPC), Health Canada. Results include reports from both outbreak situations and sporadic cases of respiratory illness. These data are then reported back weekly to the PHB of the MOHLTC. During the 2002/03 influenza surveillance season, 15 laboratories in Ontario participated in laboratory surveillance. The participating laboratories included public health laboratories in Toronto, Kingston, Timmins, Windsor, Thunder Bay, Sault Ste. Marie, Orillia, Ottawa, Peterborough and Hamilton. Participating hospital-based laboratories included: Children's Hospital of Eastern Ontario (Ottawa), Toronto Medical Laboratory, Women's College Hospital, Hospital for Sick Children (Toronto); and St. Joseph's Hospital (London). All laboratory data were summarized in the weekly *Ontario Influenza Bulletin*.

Figure 1. Laboratory Confirmations of Influenza, Ontario, 2002/03

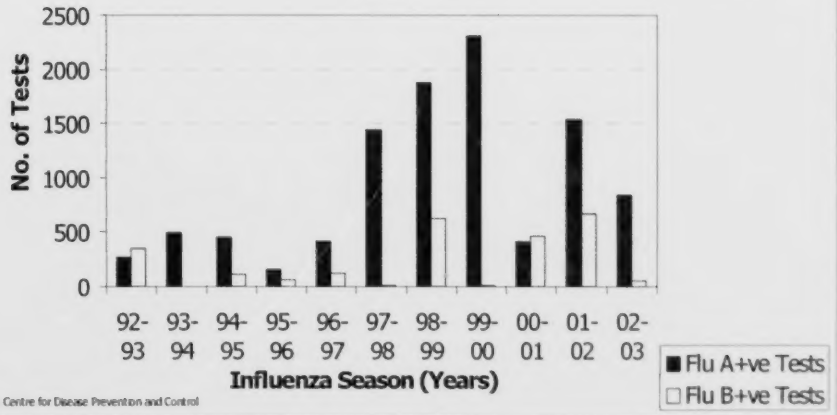


	Oct.	Nov.	Dec	Jan.	Feb	Mar.	Apr.
%Positive Tests	0	0.77	10.14	8.86	3.34	2.75	2.13
No. Tests	381	1294	2219	2923	2904	2803	4779

*Source: Centre for Disease Prevention and Control

Month

Figure 2. Laboratory Confirmations of Influenza A and B, Ontario, 2002/03



*Source: Centre for Disease Prevention and Control

Results: Influenza

Ontario

During the 2002/03 Ontario influenza season, influenza activity increased from mid-December to mid-January, earlier than the 2001/02 season. Numbers provided below reflect data obtained during Ontario's October 2002 to April 2003 influenza and respiratory outbreak surveillance season. Between (week ending) November 2, 2002 to May 3, 2003 (the period during which the national and Ontario's surveillance period most closely overlapped), participating laboratories in Ontario reported a total of 892 positive influenza isolates, a 59.6% decrease over the previous season's 2,207 influenza isolates. Of these 892 positive tests, 840 (94.2%) were influenza type A and 52 (5.8%) were influenza type B (Figs 1 and 2). The total number of laboratory isolates reported represented both outbreak activity and data on individual sporadic cases.

Results: Non Influenza Organisms

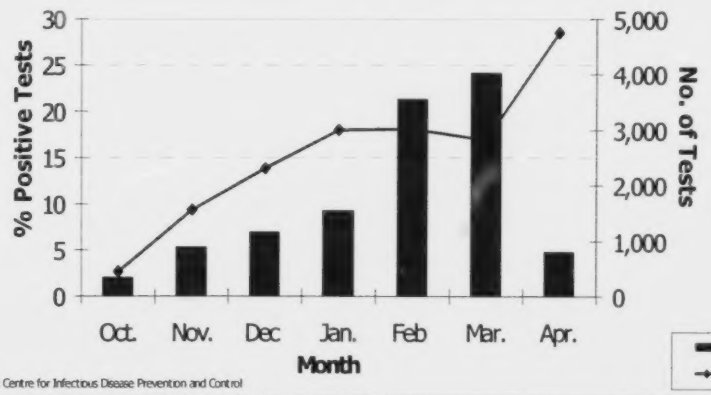
Other respiratory viruses isolated during the season are shown in Figures 3, 4 and 5. PIV viruses predominated in the province during the early part of the season while RSV and adenoviruses circulated in the province throughout the season. From November 2, 2002, to May 3, 2003, Ontario laboratories reported 457 laboratory-confirmed cases of PIV, 2125 cases of RSV and 141 laboratory-confirmed cases of adenovirus to the Health Canada Center for Infectious Disease Prevention and Control (CIDPC).

Results: Influenza

Canada

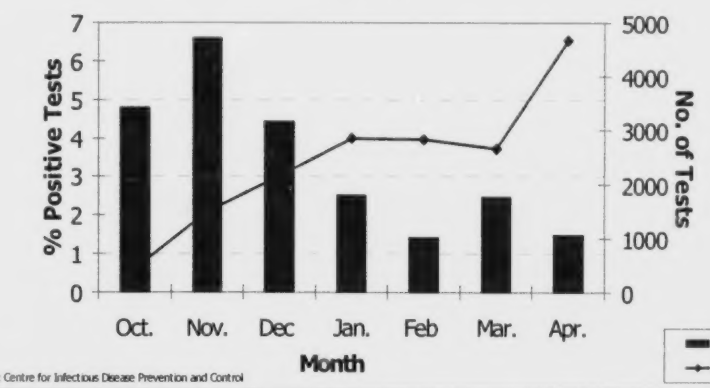
During Canada's 2002/03 influenza season, (corresponding to national surveillance dates of November 2, 2002 to May 3, 2003) the CIDPC reported 3,337 laboratory-confirmed

Figure 3. Laboratory Confirmations of Respiratory Syncytial Virus, Ontario, 2002/03



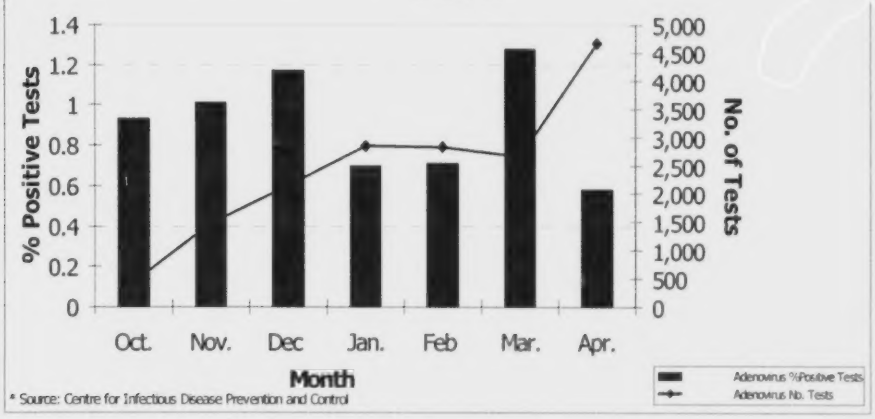
* Source: Centre for Infectious Disease Prevention and Control

Figure 4. Laboratory Confirmations of Parainfluenza, Ontario, 2002/03



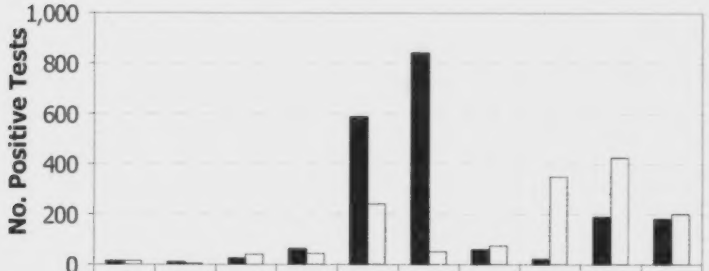
* Source: Centre for Infectious Disease Prevention and Control

Figure 5. Laboratory Confirmations of Adenovirus, Ontario, 2002/03



* Source: Centre for Infectious Disease Prevention and Control

Figure 6. Laboratory Confirmation of Influenza A and B, Canada, 2002/03



	Nfld	PEI	NS	NB	Que.	Ont.	Man.	Sask.	Alta.	BC.
■ Flu A+ve Tests	14	12	26	63	589	840	60	24	189	182
□ Flu B+ve Tests	15	3	40	43	240	52	76	351	422	202

cases of influenza, of which 1,915 (57.4%) cases were influenza A and 1422 (42.6%) cases were influenza B (based on data received from Health Canada on July 15, 2003). These figures represent a 49.4% decrease in the total number of positive influenza specimens as compared to Canada's 2001/02 influenza season, when a total of 6,592 positive influenza specimens were reported during the same period. For 2002/03, Ontario reported the highest numbers of laboratory-confirmed influenza specimens, while PEI reported the lowest numbers: 12 cases of influenza A and 3 cases of influenza B.

Results: Non influenza Organisms

Canada

During Canada's 2002/03 surveillance period (corresponding to the national surveillance dates of November 2 to May 3, 2003), the CIDPC reported 1,079 laboratory-confirmed cases of PIV, 6,718 cases of RSV and 469 laboratory-confirmed cases of adenovirus, the 3 respiratory viral organisms for which routine testing is conducted.

Composition of the 2002/03 Canadian Influenza Vaccine

The influenza vaccine for the 2002/03 season was developed based on antigenic characteristics of current and emerging influenza virus strains. The trivalent influenza vaccine developed for the 2002/03 season included the following: an A/New Caledonia/20/99 (H1N1)-like virus, A/Panama/2007/99 (H3N2)-like virus and B/Hong Kong/330/2001-like virus. Note: the influenza A (H1N2) virus strain is a reassortment virus derived from the influenza A(H1N1) and A(H3N2) virus strains. This strain circulated widely during

the 2001-2002 season and like last season the current vaccine is expected to provide protection against this virus.

Influenza strains circulating in Canada

The predominant circulating strains in Canada were A/(H1N2) and B/ Hong Kong/330/01-like. Additional circulating strains included A/New Caledonia/20/99 (H1N1)-like and A/Panama/2007/99 (H3N2)-like. During the 2002/03 influenza season, the National Microbiology Laboratory (NML) at Health Canada, sub-typed and characterized 442 influenza isolates between September 18, 2002 to May 5, 2003. Of the total, 247 were A/(H1N2),
96 were B/ Hong Kong/330/01-like,
64 were A/New Caledonia/20/99 (H1N1)-like and
35 were A/Panama/2007/99 (H3N2)-like.

Influenza Strains Circulating in Ontario

In Ontario, between October 2002 and April 2003, the strains identified and characterized by NML were: 133 A/(H1N2), 7 B/ Hong Kong/330/01-like, 6 A/New Caledonia/20/99 (H1N1)-like and 14 A/Panama/2007/99 (H3N2)-like, for a total of 160 isolates.

Reportable Disease Information System (RDIS): Cases of Confirmed Influenza

In Ontario, influenza is a reportable disease under *Regulation 559/51* of the *Health Protection and Promotion Act* (HPPA) and boards of health are required to transmit data on all laboratory-confirmed cases of influenza to the PHB through RDIS. Since only laboratory-confirmed cases of influenza are entered through RDIS, an incomplete depiction of the true number of influenza cases in Ontario results. Information obtained from reports on institutional outbreaks (section 3) enhances tracking of the total number of cases of influenza in the province.

The RDIS influenza case definition includes the following:

- clinically compatible signs and symptoms of influenza with either:
  - a laboratory confirmation by detection or isolation or influenza virus in pharyngeal or nasal secretions; or
  - demonstration of a four-fold or greater increase in hemagglutination antibody titres to influenza (seroconversion).

Results

Between October 1, 2002 and April 30, 2003, through RDIS, a total of 913 cases of influenza were reported through RDIS. Of these cases, 847 (92.8%) were influenza type A, and 66 (7.2%) were influenza type B (Figure 7, Table 2). There was a 57.3% decrease in influenza cases reported through RDIS during the 2002/03 surveillance season as compared to the previous season when 2,138 cases were reported. Age distribution for influenza cases showed that most of the RDIS-reported cases occurred among the youngest residents of the province (Figure 8). Children aged less than 5 years represented 48.4% of all laboratory-confirmed influenza cases, with 429 cases of influenza A and 13 cases of influenza B cases for that age group. Young children and adolescents were also affected by the influenza virus with 92 total cases of influenza among the 5 to 9 year olds (10.1% of total cases); 76 cases among those aged 10 to 14 (8.3%) and 68 cases among the 15 to 19 year olds (7.4%).

Sixty-two confirmed cases of influenza A and one case of influenza B were reported among individuals aged 70 years and greater. This age group comprised 6.8% of the total cases of influenza reported through RDIS during the season.

Table 1. Influenza Strains Circulating in Canada 2000/01 to 2002/03 Seasons

Season	Main Circulating Strains	Season's Vaccine Strains
2000/01	A/New Caledonia/20/99-like (H1N1) A/Panama/2007/99-like(H3N2) B/Yamanashi/166/1998-like	A/New Caledonia/20/99 like (H1N1) A/Panama/2007/99 like(H3N2) B/Yamanashi/166/1998 like
2001/02	A/Panama/2007/99-like (H3N2) B/Hong Kong/22/01 -like B/Sichuan/379/99-like B/Sichuan/379/99-like	A/Moscow/10/99(H3N2) like A/New Caledonia/20/99 (H1N1) like
2002/03	A/Panama/2007/99(H3N2)-like A/(H1N2)* A/New Caledonia/20/99 (H1N1)-like B/Hong Kong/330/01 -like	A/Panama/2007/99 (H3N2) like A/New Caledonia/20/99 (H1N1) like B/Hong Kong/330/2001 like

* Note: the influenza A (H1N 2) virus strain is a reassortment virus derived from the influenza A(H1N1) and A (H3N2) virus strains.

Source: Respiratory viruses section, National Microbiology Laboratory (NML), Population & Public Health Branch, Health Canada

The majority of influenza B cases occurred among younger age groups. There were 13 (13.7%) cases of influenza B among infants and children younger than 5 years, as compared to two cases (3%) of influenza B that occurred among adults aged 40 to 49 years of age (Figures 7 & 8).

Table 2 shows the distribution of the influenza cases by health unit and region reported through RDIS. During the 2002/03 surveillance season, numbers of influenza cases per capita was highest in the Northern and Central West regions of the province where rates of influenza cases were 9.08/100,000 population and 9.03/100,000 population respectively. The Eastern region had the lowest rate at 5.05/100,000 population; the rate for the Central East was 7.86/100,000 population and for the Southwest region the rate was 7.09/100,000 population. Health units reported two fatal cases of influenza A (no fatalities as a result of influenza B) through RDIS in the province during the 2002/03 season; a mortality rate of .01/100,000 population in Ontario. Influenza was the underlying cause of death in one case and contributing in the second case. The cause of death was undefined in an additional case. Deaths occurred among elderly cases, occuring in individuals aged 80 and over.

3. Reports of Influenza and Respiratory Infection Outbreaks in Institutions, Ontario, 2002/03 Season

Since 2001, in addition to reporting influenza outbreaks, all health units were required to report all respiratory infection outbreaks caused by known or unknown respiratory organisms that occurred in Long-Term Care Facilities (LTCFs) and health care institutions in their jurisdictions.

Figure 7. Total number of reported Influenza cases, by Month of Onset, Ontario 2002/03

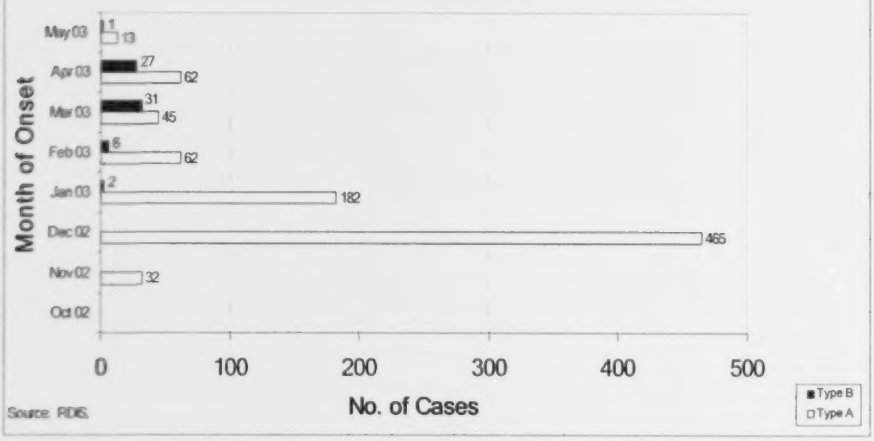
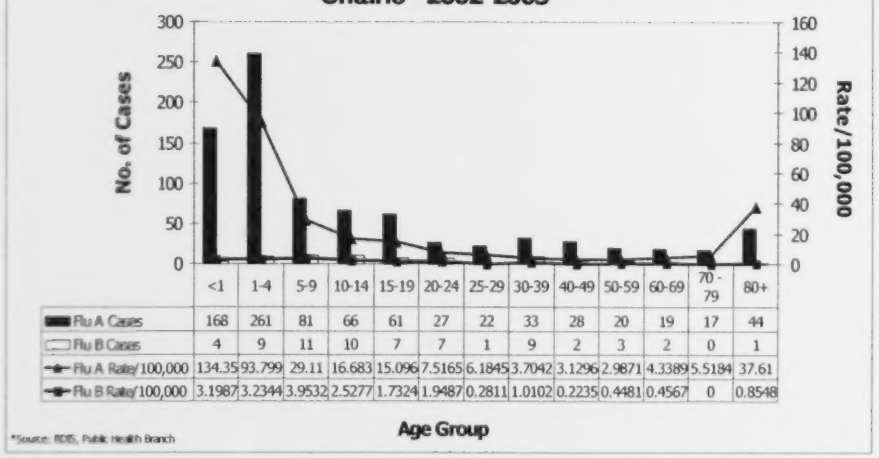


Figure 8. Reported Influenza Cases and Rates by Age Group, Ontario* 2002-2003



	<1	1-4	5-9	10-14	15-19	20-24	25-29	30-39	40-49	50-59	60-69	70-79	80+
Flu A Cases	168	261	81	66	61	27	22	33	28	20	19	17	44
Flu B Cases	4	9	11	10	7	7	1	9	2	3	2	0	1
Flu A Rate/100,000	134.35	93.799	29.11	16.683	15.096	7.5165	6.1845	3.7042	3.1296	2.9871	4.3389	5.5184	37.61
Flu B Rate/100,000	3.1987	3.2344	3.9532	2.5277	1.7324	1.9487	0.2811	1.0102	0.2235	0.4481	0.4567	0	0.8548

Table 2. Reported Influenza Cases by Health Unit and Region, Ontario, October 1, 2002 to April 30, 2003 *

Health Region	Health Unit	Population 2001*	Number of Influenza cases (A & B)	Rate per 100,000 population
Northern	Algoma	122,094	6	4.91
	North Bay	95,943	9	9.38
	Northwestern	84,280	6	7.11
	Porcupine	94,559	13	13.74
	Sudbury	198,604	13	6.54
	Thunder Bay	160,399	15	9.35
	Timiskaming	36,478	10	27.41
Region Total		**792,357**	**72**	**9.08**
Eastern	Eastern Ontario	195,327	14	7.16
	Hastings-Prince Edward	159,003	6	3.77
	Kingston-Frontenac	181,794	20	11
	Leeds-Grenville	164,773	7	4.24
	Ottawa City	800,525	29	3.62
	Renfrew	102,331	5	4.88
Region Total		**1,603,753**	**81**	**5.05**
Central East	Durham	523,013	37	7.07
	Haliburton-Kawartha	153,801	9	5.85
	Muskoka-Parry Sound	100,320	8	7.97
	Peel Region	1,047,097	126	12.03
	Peterborough	129,732	3	2.31
	Simcoe County	389,221	16	4.11
	Toronto City	2,562,235	194	7.57
	York Region	778,292	54	6.93
Region Total		**5,683,711**	**447**	**7.86**
Southwest	Grey Bruce	158,288	22	13.89
	Elgin-St.Thomas	84,775	4	4.71
	Huron	60,616	8	13.19
	Chatham-Kent	112,032	7	6.24
	Lambton	132,010	8	6.06
	Middlesex-London	417,477	14	3.35
	Oxford	103,150	21	20.35
	Perth	75,974	20	26.32
	Windsor-Essex	391,736	5	1.27
Region Total		**1,536,058**	**109**	**7.09**
Central West	Brant	128,109	5	3.9
	Haldiman-Norfolk Region	108,859	14	12.86
	Halton Region	387,388	30	7.74
	Hamilton City	503,043	63	12.53
	Niagara Region	426,912	16	3.74
	Waterloo Region	456,767	29	6.34
	Wellington-Dufferin	247,479	47	18.99
Region Total		**2,258,557**	**204**	**9.03**
Provincial Total		**11,874,436**	**913**	**7.68**

* Source: RDIS, Public Health Branch, Ministry of Health and Long-Term Care

** Source: Provincial Health Planning Database June 30, 2003

Data were collected and analyzed for outbreaks that occurred in LTCFs, retirement homes (RH) of more than 10 residents, acute care hospitals (ACH), chronic care hospitals (CCH), psychiatric hospitals, and schedule I and II facilities (the latter two facilities designated as "other").

As was done for the 2001-2002 surveillance season, for this year's surveillance period, data on combined LTCFs (i.e. nursing homes/homes for the aged, nursing homes/retirement homes) were included in LTCF reports. In summary reports prior to the 2001-2002 season, LTCFs included only nursing homes and homes for the aged.

Criteria for a potential influenza outbreak in an institution are:

- one laboratory confirmed case - residents, patients or staff - with an organism such as influenza virus isolated or detected from a nasopharyngeal swab or with 4-fold or greater hemagglutination antibody titre; or
- two cases of acute respiratory tract illness occurring within 48 hours in a geographic area; or
- more than one unit (in a facility) having a case of acute respiratory illness within 48 hours.

The last two bullets also constitute criteria for a potential respiratory outbreak caused by organisms other than influenza.

Any further progression of the "potential outbreak" is to be considered an outbreak. Epidemiologically linked clinical cases are also included in the total number of cases for an institutional respiratory infection outbreak.

Reports on respiratory outbreaks in institutions include epidemiologic information on residents/patients and staff such as influenza immunization coverage rates, morbidity and mortality attributes, duration, seasonal distribution of outbreaks, and antiviral usage for prophylaxis or therapy to control an outbreak. Preliminary reports were faxed to the Public Health Branch, MOHLTC, within 24 hours of outbreak onset. Preliminary reports were useful for warning purposes and for monitoring respiratory outbreak activity in the province.

Final reports were submitted after outbreaks were declared over, and were used in the formulation of this summary report.

Results

There were 185 confirmed institutional respiratory outbreaks reported to the MOHLTC during the 2002/03 season, of which 25 were attributed to influenza. This represents a 41.6% decrease in the number of respiratory outbreaks (87.2% decrease in the number of influenza outbreaks) over the 2001/02 season, in which 317 respiratory outbreaks occurred, 195 of which were attributed to influenza. The decrease in influenza cases may be explained by the fact that circulating viruses were closely related to the vaccine strains utilized and a decrease in influenza activity, also experienced nationally. Twenty-nine of 37 health units reported at least one respiratory outbreak this season, with the majority of outbreaks occurring in LTCFs.

Data Analysis
Causative Organisms

Of the 185 reported respiratory outbreaks, 25 (13.5%) were laboratory-confirmed influenza outbreaks: 24 were due to influenza A, none were due to influenza B and, in one outbreak, influenza was combined with other organisms as shown in Table 3.

The 2002/03 surveillance season was the second year in which institutional outbreaks due to other respiratory organisms were reportable. A number of non-influenza organisms were detected in 50 of the outbreaks: 26 RSV, 20 by PIV, two outbreaks combined both RSV and PIV and one outbreak combined PIV and Rhinovirus, also known as the common cold. One additional outbreak was caused by the Rhinovirus. In 110 respiratory outbreaks, the causative organism was unknown.

Distribution of Respiratory Outbreaks, including influenza, by Health Unit

During the 2002/03 surveillance season, 29 of 37 (78.4%) health units reported at least one institutional respiratory infection outbreak. Of these 29 health units, 16 (43.2%) reported 5 or more outbreaks and two health units (Middlesex-London and the amalgamated city of Toronto) each reported more than 20 outbreaks.

A total of 25 influenza infection outbreaks were reported by 17 of 37 (45.9%) health units. Thirteen of 37 health units reported only one outbreak, and only one health unit (Toronto) reported 5 or more influenza outbreaks.

A total of 160 respiratory infection outbreaks due to non-influenza organisms were reported by 27 of 37 (73%) provincial health units, of which 50 (31.3%) were attributed to a known causative organism. Thirteen health units reported 5 or more outbreaks while 5 reported 10 or more outbreaks.

Respiratory Outbreaks, including influenza, in Institutions

There were a total of 185 respiratory infection outbreaks reported in institutions in the province during the 2002/03 season. Of these, 161 (87%) were reported from the following types of LTCFs: 116 (62.7%) occurred in Nursing Homes (NHs), 43 (23.2%) in Homes For the Aged (HFA) and two outbreaks (1.1%) were in combined facilities: one outbreak in combined Nursing Home/Home for the Aged (NH/HFA) and one outbreak in a Nursing Home/Retirement Home (NH/RH) combination.

Of the total number of respiratory infection outbreaks, none were in acute care hospitals (ACHs), 8 (4.3%) were in chronic care hospitals (CCHs) and 11 (6%) occurred in RHs that had

Table 3. CAUSATIVE ORGANISMS, RESPIRATORY OUTBREAKS 2002/03

Influenza Outbreaks	No. of Outbreaks	Non-Flu Outbreaks	No. Of Outbreaks
Influenza A	24	RSV	26
Combined Flu A, PIV & Rhinovirus	1	PIV	20
		RSV & PIV	2
		PIV & Rhinovirus	1
		Rhinovirus	1
		Unknown	110
TOTAL	**25**		**160**

more than 10 residents with one of these outbreaks occuring in a combined RH an "other" type of facility, as defined earlier. Additionally, 5 cases (2.7%) occurred in "other" institutions.

A total of 25 influenza infection outbreaks were reported in institutions. LTCFs made up 76% of reporting institutions: 16 (64% if total number of influenza outbreaks) occurred in NHs and 3 in HFAs (12%). There were no influenza outbreaks in ACHs, one in CCHs (4%), two in RHs with over 10 residents (8%), one in a combined RH and "other" institution (4%) and 2 (8%) in "other" institutions.

There were a total of 160 institutional respiratory outbreaks caused by organisms other than influenza. LTCFs made up 88.8% of the institutions that experienced this type of outbreak: 100 (62.5% of total non-influenza outbreaks) in NHs, 40 (25%) in HFAs, and two outbreaks in combined facilities (1.3%). There were no outbreaks in ACHs, 8 (5%) in RHs with more than 10 residents and three (1.9%) occurred in "other" institutions. There were 7 (4.4%) reported outbreaks attributed to non-influenza organisms in CCHs.

As was for the 2001/02 season, outbreak duration was defined *as the number of days from the onset of illness in the first case until the outbreak was declared over.* This differs from earlier reports when outbreak duration was defined as the period between the onset of illness in the first case and onset of illness in the last case. The definition of duration was changed to ensure uniformity among health units in application of the definition.

Due to the wide range of data results, median results are reported.

For the 185 respiratory outbreaks, median duration was 19 days (range 7-110 days) (Table 4). For outbreaks in which the causative organism was unknown, median duration was 17 days (8-44).

Median duration of the outbreaks caused by influenza A alone was 19 days (range 10-110 days). Only one outbreak was caused by influenza A in combination with another organism and thus will not be reported.

Median duration for outbreaks due to non-influenza organisms was 19 with a range of 7-54 days.

Occurrence of Respiratory Outbreaks, including influenza

For all institutional respiratory outbreaks, peak activity occurred in December, with a total of 40 outbreaks (Figure 9).

Outbreak activity due to influenza infection experienced bimodal peaks in December and February, while respiratory disease outbreaks due to non-influenza activity similarly experienced biomodal peaks in December and March.

Table 4. MEDIAN DURATION OF RESPIRATORY OUTBREAKS BY ORGANISM TYPE 2002/03*

Influenza Outbreaks	No. of Days (Range)	Non-Flu Outbreaks	No. of Days (Range)
Influenza A	19 (10-110)	RSV	21 (12-54)
		PIV	22 (7-36)
		Unknown	17 (8-44)

** Outbreaks caused by a combination of organisms excluded because of small cell size i.e. <5*

Peak activity for the 110 outbreaks for which a causative organism was not known also occurred in December, remaining at relatively stable levels through March.

Attack Rates and Vaccine Efficacy for Institutional Respiratory Outbreaks, including influenza

Residents

During the 184 outbreaks for which there were sufficient data, 3,134 cases were reported among 18,180 residents/patients. The overall attack rate for the season (total number of resident cases for all outbreaks/total number of residents in affected areas of institutions involved in the outbreak) was 17.2%.

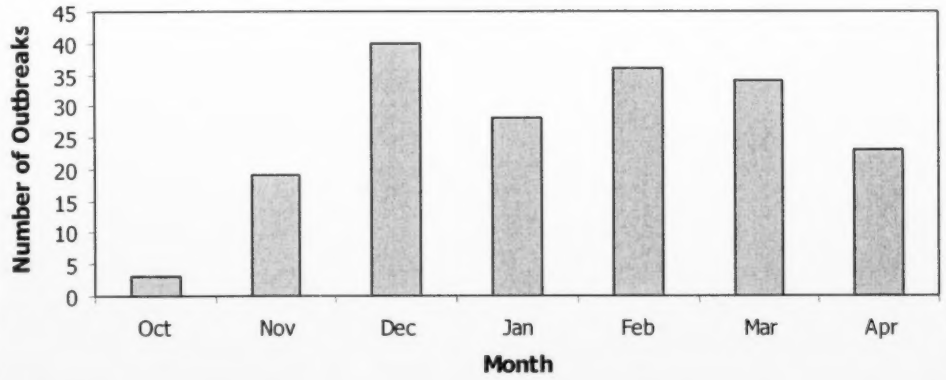
for all respiratory outbreaks/ total number of residents in affected areas of LTCFs involved in the outbreak) was 16.7%. This calculation includes data only for those institutions that supplied both numerator and denominator to calculate attack rates.

The median attack rate for all institutions was 17.0% (range 1-82.1). The median attack rate for LTCFs was as follows: rate for NHs was 17.6% (range 2.7-58.4) and for HFAs was 13.8% (range 1-56.4).

For CCHs the rate was 18.8% (11.9-27.8) and for RHs the rate was 25.0% (8.3-82.1).

For "other" institutions, this rate was 28.6% (17.6-47.6).

Figure 9. Institutional Respiratory Outbreak by Month, Ontario 2002/03



The median resident attack rate for all respiratory outbreaks was 17.0% (range 1.0-82.1). The outbreak with the highest resident attack rate (82.1%) occurred in a retirement home where 32 out of the 39 at-risk residents experienced a respiratory infection with an unknown organisms.

The median attack rate for influenza infection outbreaks was 18.0% (range 4.8-48.7) while for non-influenza outbreaks this rate was 16.2% (range 1.0-82.1).

Due to the small number of influenza outbreaks with resident/patient vaccination information, vaccine efficacy could not be assessed.

Attack rates for Respiratory Outbreaks, including influenza, by Institution Type

Residents

For the 160 LTCF institutional respiratory outbreaks including infiuenza for which data were available, 2,847 cases were reported among 17,085 residents. The overall attack rate for the season (total number of resident cases

Attack rate for influenza outbreaks

Residents

For the 19 LTCF institutional influenza outbreaks for which data were available, 446 cases were reported among 2236 residents. The overall attack rate for the season (total number of resident cases for all influenza outbreaks/total number of residents in affected areas of LTCFs involved in the outbreak) was 19.9%. The median attack rate for all LTCFs was 16.0% (range 4.8-48.7) and for NHs was 15.8% (4.8-48.7)

The median attack rate for all institutions was 18.0% (range 4.8-48.7). Median attack rates were not calculated for "other."

Attack rates for non-influenza outbreaks

Residents

For the 141 LTCF institutional non-influenza outbreaks for which data were available, 2,401 cases were reported among 14,849 residents. The overall attack rate for the season (total number of resident cases for all non-influenza outbreaks/total number of residents in affected areas of

Table 5. Median Resident Attack Rates, All Respiratory Outbreaks by Institution Type (%)

Type of Institution	Resident Median Attack Rate	(Range)
Nursing Home	17.2	(2.7-58.4)
Home for the aged	13.8	(1.0-56.4)
Retirement Home	25.0	(8.3-82.1)
Chronic Care Hospital	18.8	(11.9-27.8)
Other Facilities	28.6	(17.6-47.6)

LTCFs involved in the outbreak) was 16.2%. The median attack rate for all institutions was 16.2 % (range 1-82.1). The median attack rate for LTCFs was 15.5% (1-58.4). Median attack rates for NHs were 17.6% (2.7-58.4) and for HFAs were 13.6% (1-56.4). For RHs the rate was 26.3% (8.3-82.1) and for CCHs was 16.2% (11.9-27.8).

Staff Attack Rate

A total of 613 staff cases were reported among 25,832 exposed in 179 institutional respiratory outbreaks for which data were available, giving an overall attack rate of 2.4%. For LTCFs alone, there were 575 cases among 22,068 at-risk staff during 160 outbreaks with an overall attack rate of 2.6%.

The median staff attack rate for respiratory outbreaks in all facilities was 1.6% (range 0-50) and for LTCFs the rate was 1.9% (0-50). Median staff attack rate for influenza outbreaks in all institutions was 2.9% (range 0-16.7) and for non-influenza outbreaks was 1.3% (0-50). Staff were excluded from work in 23 (14.6%) of 157 respiratory outbreaks for which data were available.

In 21 of the 23 instances staff were excluded in accordance of institutional policy. In one case, s. 22 of the *Health Protection and Promotion Act* was used, and in the remaining case, the reason was not reported.

Resident Vaccination Rate

For the 17 influenza outbreaks for which reports on vaccination rates were available, the median vaccination rate was 94.5% (range 83.6-99.3%). Of the 19 influenza outbreaks reported in LTCFs, resident vaccination rates were reported for 14 (78.9%). The median vaccination rate in LTCFs was 94. Ten LTCFs reported rates less than 95%, the rate recommended in the *Mandatory Health Programs and Services Guidelines*. Five institutions reported vaccination rates exceeding 95%.

Complications and Mortality among Residents for Respiratory Outbreaks, including influenza

Institutions that reported respiratory infection outbreaks during the 2002/03 surveillance season experienced a total of 79 deaths attributed to the outbreak. All of these occurred in LTCF outbreaks in which the mean case fatality rate was 2.2%. The mean case fatality rate for all institutions that reported outbreaks was 1.9%.

For all institutional respiratory outbreaks, the number of cases hospitalized as a consequence of the outbreak was 113, of these 96 (85%) occurred in LTCFs.

There were 132 radiologically confirmed cases of pneumonia as a result of respiratory outbreak activity, 123 (93.2%) of which occurred in LTCFs.

In institutions reporting influenza outbreaks, there were a total of 20 deaths, or 25.3% of the total number of deaths attributed to respiratory outbreaks. There were 21 radiologically confirmed cases of pneumonia (15.9% of the total number of cases) and a total of 26 cases were hospitalized (23.0%) as a consequence of the influenza outbreak.

LTCFs represented a significant proportion of institutions reporting complications as a result of an influenza outbreak. Of the 20 deaths that occurred as a result of influenza, all occurred in LTCFs. Of the total 21 cases of radiologically confirmed pneumonia, 20 (95.2%) occurred in LTCFs. Similarly, LTCFs represented 19 of the total 26 (73.1%) influenza related hospitalizations.

Institutions reporting non-influenza outbreaks noted 59 patient deaths (74.7% of the total), 111 radiologically confirmed cases of pneumonia (84.1%), with a total of 87 patients hospitalized (77.0%) as a consequence of the outbreak.

In LTCFs, the total number of deaths attributed to non-influenza outbreaks was 59 (74.7% of the total number of respiratory outbreak related deaths). There were 103 cases

of radiologically confirmed pneumonia (92.8%) and 77 cases were hospitalized (88.5%) as a result of respiratory outbreaks due to organisms other than influenza.

A total of 27 deaths occurred among residents for whom a causative organism was not found.

Vaccine efficacy with respect to case fatality rates was not done due to small cell size.

Antivirals

In Ontario, anti-virals have been in use for the prophylaxis and treatment of influenza A infections since 1988, and Amantadine is recommended for outbreak prophylaxis in institutions. Although neuraminidase inhibitors have not been approved by Health Canada for prophylactic use at this time, there is some evidence from randomised, controlled trials that these medications are also effective in prophylaxis.

During the 2002/03 season, antivirals were administered in 24 of 25 (96%) influenza outbreaks for which data were available. Amantadine was given to residents for prophylaxis in 5 of 24 (20.8%) influenza outbreaks this season, and a neuraminidase inhibitor, Oseltamivir (Tamiflu[a]) was also administered with Amantadine in 9 (37.5%) outbreaks for treatment or prophylaxis. Oseltamivir alone was administered in 10 (41.7%) outbreaks where antivirals were used.

4. Influenza Activity Level Reporting

Every week, influenza activity was assessed and reported by the medical officer of health of each health unit to the Public Health Branch. The data was then mapped and published weekly in the *Ontario Influenza Bulletin*. Suggested indicators for determining local influenza activity included the following: influenza-like illness (ILI) rates reported by sentinel physicians, institutional and non-institutional (e.g. day care facilities) outbreaks and results from local virology laboratories.

For the *Bulletin*, influenza activity is defined as the level of influenza-like illness (ILI) prevalent in the local community. ILI is defined by the presence of all of the following: (fever >=38°C, acute onset cough or sore throat, malaise, myalgia and/or fatigue).

Influenza activity was categorized into one of the following four designations:

- 1 = No Activity
- 2 = Sporadic Activity (sporadically occurring ILI or lab-confirmed influenza with no outbreaks detected)
- 3 = Localized Outbreaks (outbreaks affecting a single geographic area within the health unit jurisdiction; these can be institution-based and/or community outbreaks)
- 4 = Widespread Outbreaks (outbreaks affecting multiple/non-adjacent geographic areas within the health unit jurisdiction, and not involving two or more regions in a health unit.

The ranked data that is submitted to the PHB is presented graphically on a map of Ontario to show the ILI activity for the week ending January 18, 2003, the peak period for reported influenza activity.

Results

On average, 26 (70%) of the 37 health units in Ontario reported weekly throughout the influenza season (range: 15-33). Activity levels fluctuated from "no activity" to "sporadic activity" from early November to late December, then progressed to "localized outbreaks" in early January until early May. A few health units reported "widespread outbreaks" from mid to late January.

5. Health Canada/College of Family Physicians of Canada (CFPC) *FluWatch* Program

Established in the 1999/00 influenza surveillance season, the Ontario Sentinel Physician Influenza Surveillance (SPIS) was discontinued for the 2000/01 season. In place of SPIS, sentinel physician data were collected, collated and disseminated through the national *FluWatch* program. The College of Family Physicians of Canada (CFPC) recruited 72 physicians by census divisions across Ontario, for the *FluWatch* program. Sentinel physicians were asked to report the number of cases of influenza-like-illness (ILI) per age group for one day each week, and the total number of patient visits per age group for the same day. The rates of visits to sentinel physicians for ILI ranged from 12 to 40 visits of ILI per 1,000 patients seen.

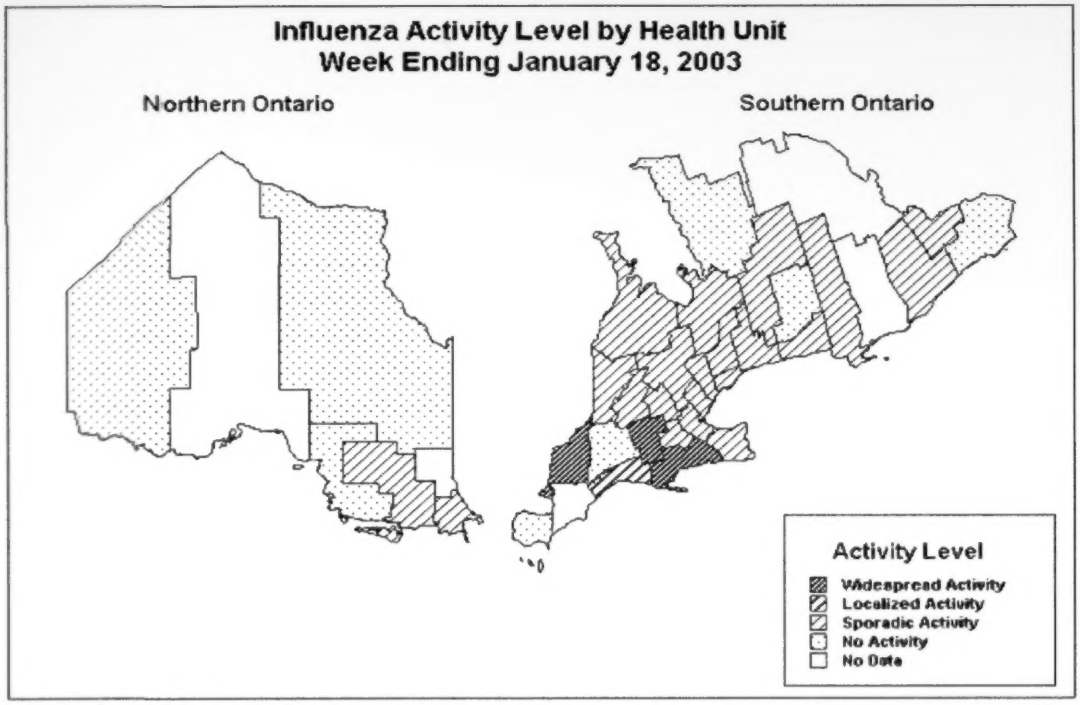
Vaccination Rates in LTCFs and Hospitals (All facilities)

The *Mandatory Health Programs and Services Guidelines (MHPSG)* issued under the *HPPA* 1990, state that all LTCFs should achieve the provincial immunization target rate of 95% for residents. Under the "Influenza Prevention and Surveillance Protocol for Ontario Long-Term Care Facilities" released by the MOHLTC in November 1999 and the "Influenza Surveillance Protocol for Public Hospitals" issued by the Ontario Hospital Association in July 2000, influenza vaccine coverage rates from residents and staff of LTCFs and staff of public hospitals are to be reported to the local medical officer of health by December 1 of each year. The rates are then reported to the province by the health unit. The following information was reported in December 2002 for the 2002/03 influenza season.

Residents

Immunization data collected from 487 of 543 LTCFs indicated that the median influenza vaccination coverage achieved for residents this season was 95.0 % as compared to the previous season, which was 95.5%.

LTCFs that reported respiratory outbreaks reported median influenza immunization coverage of 94.9% (range 64.5-100) for residents.



Staff

Staff influenza immunization coverage rate was reported for 487 of 543 **LTCFs**. LTCF staff median coverage rate for this season was 82.4 %, as compared to the previous season, which was 86.4%.

The median vaccination rate of staff who worked in LTCFs that experienced respiratory outbreaks was 83% (range 37-98.9).

Staff influenza coverage was reported for 190 of 231 **hospital sites** operating under the *Public Hospital Act* in Ontario. Median staff coverage rate for the 2002/03 season was 44.0%, as compared to the previous season, which was 50.8%. There is no requirement for hospitals to report coverage rates for hospital patients.

Median immunization coverage rate for staff for the 8 hospitals that experienced respiratory outbreaks for which data was available was 47% (range 24.6-47).

Acknowledgements

The authors would like to acknowledge the assistance of the following: Shira Korman, formerly of Disease Control Service; Angie Fazzone, Mariam Pingel, and Marty Sargent of the Corporate Liaison & Resource Service; Jeanette Macey, Brian Winchester, and Peter Zabchuk of CIDPC, Health Canada; and all public health units for their participation in the provincial influenza and respiratory outbreak surveillance program.

Source

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Insight on Cancer: News and Information on Colorectal Cancer

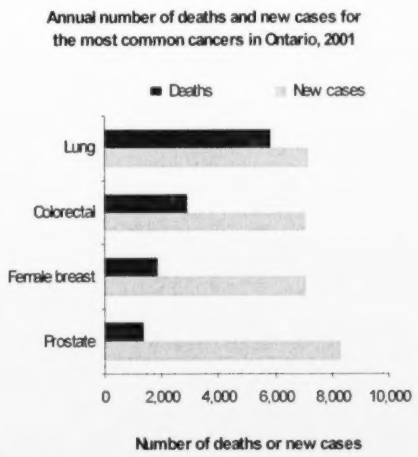
by Beth Theis, MSc, Saira Bahl, MSc, Diane Nishri, MSc, Loraine D. Marrett, PhD, W.K. (Bill) Evans, MD, FRCPC

Introduction

Insight on Cancer: news and information on colorectal cancer is one of a series of joint Cancer Care Ontario and Canadian Cancer Society (Ontario Division) publications, designed to provide up-to-date information for health professionals and policy-makers about cancer and cancer risk factors in the province. Details about how to access all issues, including the one from which the following information is taken, are found at the end of this article.

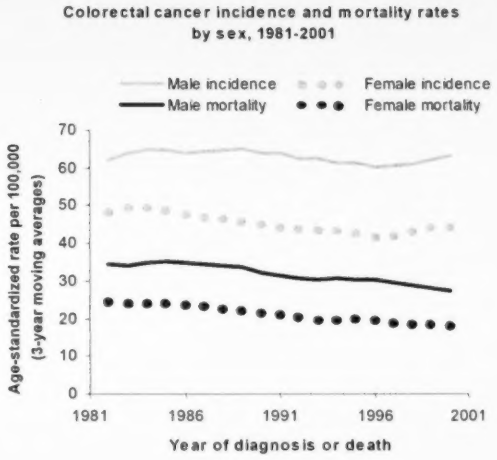
Colorectal cancer in context

With 2,914 deaths during 2001, colorectal cancer is second only to lung cancer as a cause of deaths in Ontario. Colorectal cancer is among the four most common cancers diagnosed in the province. The 7,070 new cases diagnosed during 2001 is close to the 7,155 cases of lung cancer nad 7,073 of female breast cancer.



Male and female incidence and mortality

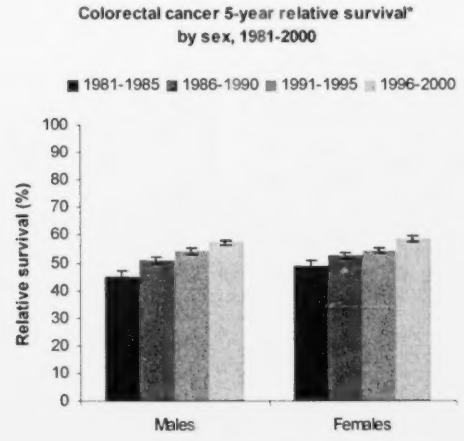
Colorectal incidence and mortality are higher for males than for females. Incidence was slightly higher in males and lower in females in 2001 as compared with 20 years earlier. Incidence rates for both sexes have risen since 1997, following earlier declines. There is no obvious explanation for the recent rise. It may be the result of greater use of colonoscopy for screening and/or diagnosis, bringing forward the diagnosis dates for some cases. The largest difference in anatomic subsites between the sexes is for rectosigmoid and rectal tumours; rates in males are nearly double those in females. Left-sided colon cancer rates are much lower than right-sided in females, and have been falling an average of 2% per year. Colorectal cancer mortality fell for both sexes between 1981 and 2001, with a decline of 20% for males and 27% for females. Falls in mortality may reflect the declining incidence in the 1980s and 1990s, and possibly earlier diagnosis and improvements in treatment. Mortality was declining even in the early 1970s, when incidence was rising.



Survival

Estimated five-year relative survival has improved steadily and significantly over two decades. Survival rose from 45% for males followed during 1981-1985 to 57% for males followed during 1996-2000. The corresponding increase for females was from 49% to 59%.

* Relative survival is a measure of the reduction in life expectancy due to a diagnosis of colorectal cancer



Risk modifiers and prevention

Physical activity decreases the risk of colon cancer (the evidence is weaker for rectal cancer). **Obesity** (usually measured by body mass index) and **central adiposity**

(usually measured as a high waist:hip ratio) increase the risk of colon cancer. There is now convincing evidence for a causal association between **smoking** and an increased risk of colorectal cancer. Risk is increased with Crohn's disease or ulcerative colitis.

Increased risk associated with colorectal cancer in close relatives may be the result of heredity, or a similar lifestyle, or a combination of these.

Research continues on the protective potential of many dietary components and of **nonsteroidal anti-inflammatory drugs** (NSAIDs).

Screening

Screening men and women over age 50 who have no symptoms of colorectal disease can lower mortality from colorectal cancer and can also lower incidence, by removing precancerous polyps. Uncertainty remains about the best test or combination of tests to use, the ideal frequency, and the age at which screening should stop.

The Canadian Task Force on Preventive Health Care published screening recommendations in 2001 in which they concluded that there is good evidence to include the fecal occult blood test (FOBT) every one to two years in the periodic health examination of people over 50.

The Canadian Cancer Society is publishing recommendations for using medical and family history to triage individuals as being at high, moderate, or low risk of hereditary/familial colorectal cancer and for management at various levels of risk. Management may include colonoscopy, FOBT, referral to a colorectal specialist and/or offering referral to a hereditary colorectal cancer clinic or genetics centre.

Colorectal screening rates in Ontario are low. Only about 20% of Ontarians aged 50-65 appear to have had any bowel investigations, most of which would not be for screening. Cancer Care Ontario and its partners are evaluating approaches to recruitment for colorectal screening with FOBT, aimed at Ontarians aged 50-75 who are at average risk of colorectal cancer (for details see www.cancercare.on.ca/prevention_colorectalScreening.htm).

Treatment in Ontario

A recent evaluation of practice within regional cancer centres affiliated with Cancer Care Ontario (CCO) found that patients with Stage III colon cancer routinely receive treatment with adjuvant chemotherapy in a fashion consistent with practice guidelines developed by CCO's Program in Evidence-based Care. Few patients with Stage II disease receive adjuvant systemic chemotherapy, which is also consistent with guidelines. Because of lack of access to data on systemic therapy treatment in Ontario, it is not currently possible to assess whether all those who might benefit from such therapy receive appropriate treatment.

From the available data, it appears that only a small percentage of patients with metastatic colon cancer are seen in Ontario's regional cancer centres for palliative chemotherapy. Although it is possible that these patients are being seen by community-based oncologists, it is also possible that referring physicians are unaware of the potential survival and symptom control benefits of palliative chemotherapy, and/or that patients decline referral because of concerns about the toxicity of treatment.

Despite evidence that radiation therapy benefits patients with Stage II and III rectal cancer, a retrospective review demonstrated that 32% of Stage II and III patients were not referred and 29% of those referred refused radiotherapy treatment.

For more information...

The full text of *Insight on Cancer: news and information on colorectal cancer* can be found on both the Canadian Cancer Society's and Cancer Care Ontario's websites. Please visit the "library section" of the Ontario pages of the Canadian Cancer Society's website located at www.cancer.ca, or visit www.cancercare.on.ca

Ms. Theis, Nishri, and Bahl are Senior Research Associates, and Dr. Marrett is a Scientist, Division of Preventive Oncology; Dr. Evans is Vice President and Chief Medical Officer, all at Cancer Care Ontario.

Ontario Cancer Facts

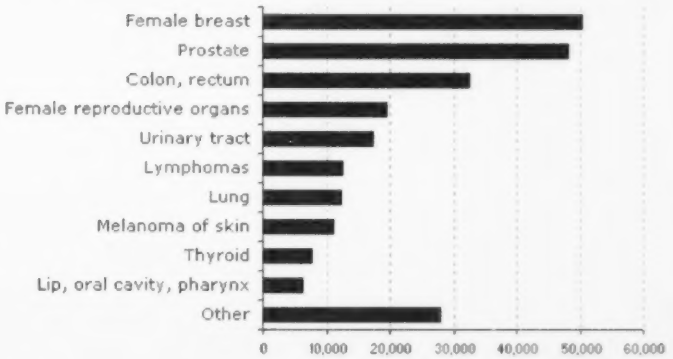
April 2004

What cancers are Ontarians living with?

An estimated 246,000 Ontarians (2% of the population) have been diagnosed with cancer sometime in the past 10 years and are still alive. Most were diagnosed with cancer of the breast (21%), prostate (20%), or colon or rectum (13%).

The numbers for each type of cancer depend on how common that type of cancer is and on how long people tend to live after being diagnosed with it. For example, lung cancer is the second most common cancer diagnosed in Ontario, but because it has poor survival, it makes only a small contribution (about 12,000 people) to the numbers shown here. While most people diagnosed with melanoma or thyroid cancer live for many years, numbers for these cancers are low because of lower numbers of new cases.

Estimated number of Ontarians alive and diagnosed with cancer in the previous 10 years*



*Estimated for the 10 years preceeding July 2002
Source: Cancer Care Ontario (Ontario Cancer Registry, 2004)

These numbers include people with a new cancer diagnosis, people diagnosed in the previous 10 years who still have cancer, and people whose cancers have been cured or are in remission. This information helps policymakers decide how health care resources should be used. Although many people with cancer recover and live long lives, they may still need follow-up visits and tests, rehabilitation and other kinds of support.

For more information, go to www.cancercare.on.ca

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Fax: 416.971.6888
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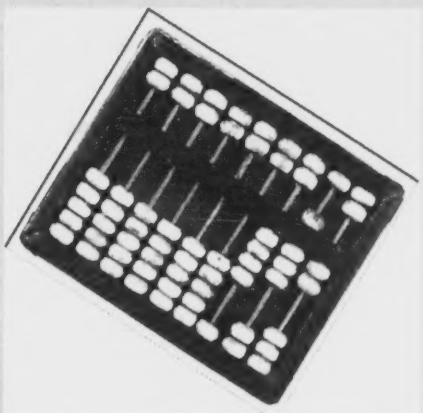
www.cancercare.on.ca

cancer care ontario

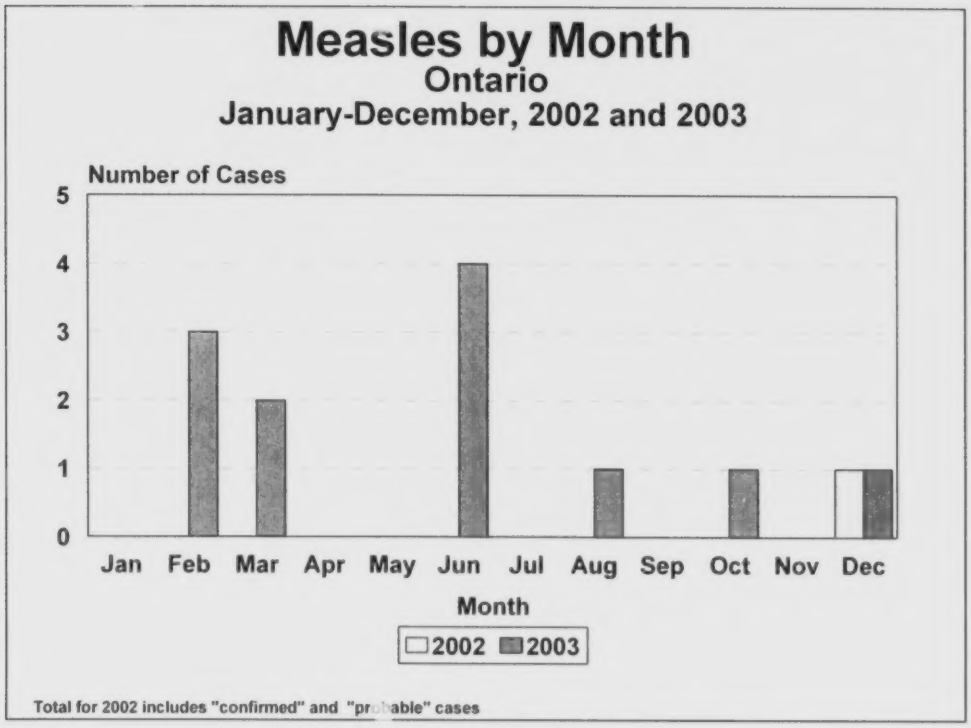
Clinical Practice Guideline (CPG) Summary		
Stage	Recommendation	Guideline number
Colon Cancer		
I	Standard treatment is surgical resection alone	No guideline
II	Adjuvant chemotherapy not routinely recommended. Patients at high risk of recurrence (presentation associated with bowel obstruction, tumour abscess or perforation, or if tumour demonstrates aneuploidy on histology) may be considered for adjuvant chemotherapy similar to Stage III	CPG #2-1
III	Adjuvant therapy is recommended within 5 weeks of surgery; 5 fluorouracil-based regimens are administered over 6-12 months	CPG #2-2
IV	Systemic therapy with oral capecitabine or 5-fluorouracil and leucovorin alone when monotherapy is selected, or 5-fluorouracil and leucovorin in combination with irinotecan when combination therapy is preferred	CPG #2-15, 2-16, 2-16b
Rectal Cancer		
II, III	Both chemotherapy and radiotherapy reduce local recurrence in resectable rectal cancer; post-operative radiotherapy combined with chemotherapy appears to provide the greatest benefit. Pre-operative radiotherapy (with post-operative chemotherapy, at least for patients with Stage III disease) is an acceptable alternative	CPG #2-3, 2-13
IV	Systemic therapy as for colon cancer	CPG #2-15, 2-16, 2-16b
Colorectal Cancer Follow-up		
I, IIa	Visits yearly or when symptoms occur; follow-up colonoscopy within 6 months of surgery; repeat yearly if villous/tubular adenomas >1 cm found, otherwise every 3-5 years	CPG#2-9
IIb, III	Assess when symptoms occur or every 6 months in first 3 years, then yearly for at least 5 years	

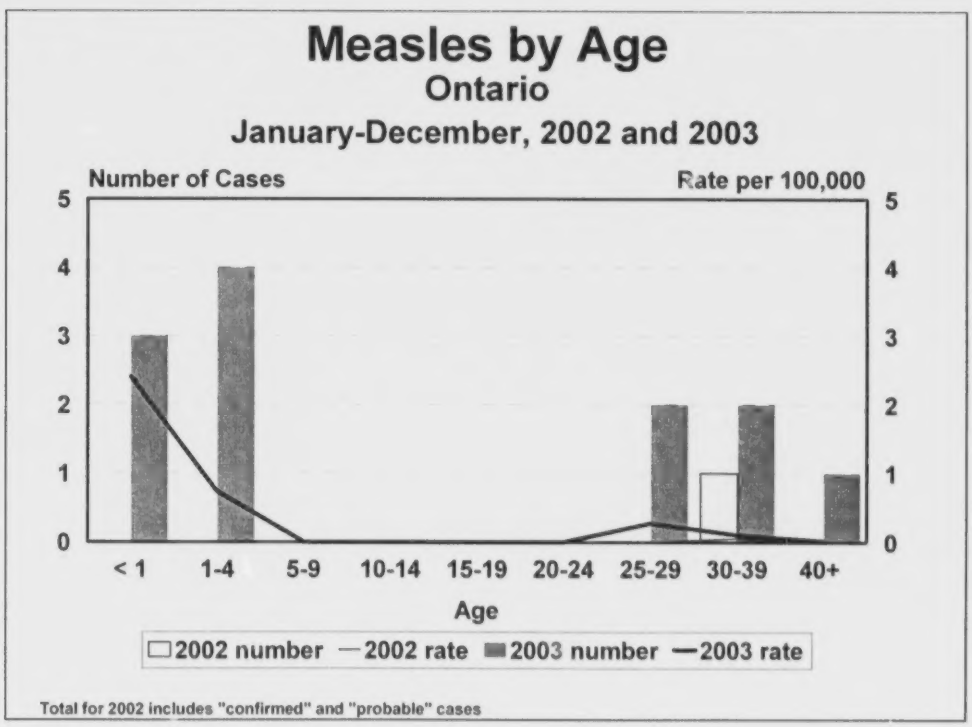
Source: Cancer Care Ontario (Program in Evidence-Based Care)
www.cancercare.on.ca/access_GICancerDSGGLsandESs.htm
Accessed 21 Jan. 04

Summary Statistics

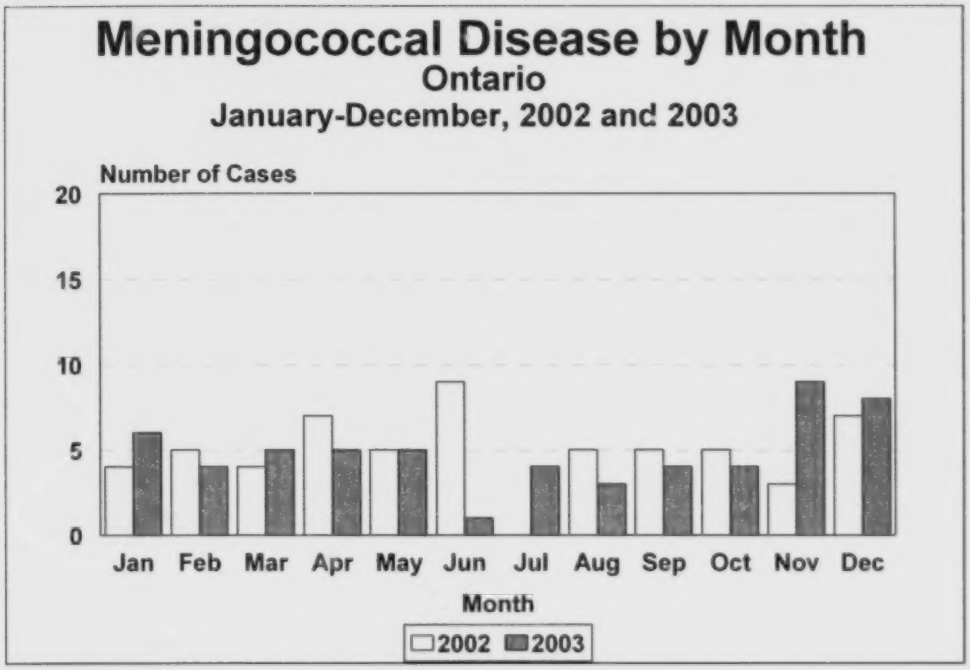


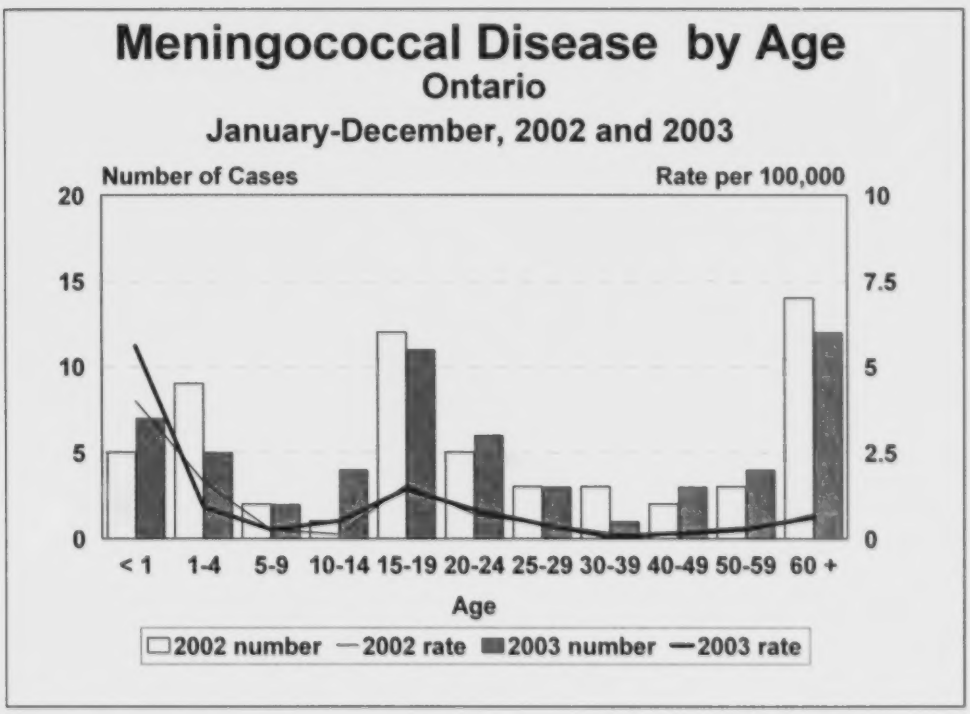
Vaccine Preventable and Other Diseases





Vaccine Preventable and Other Diseases (Cont'd)





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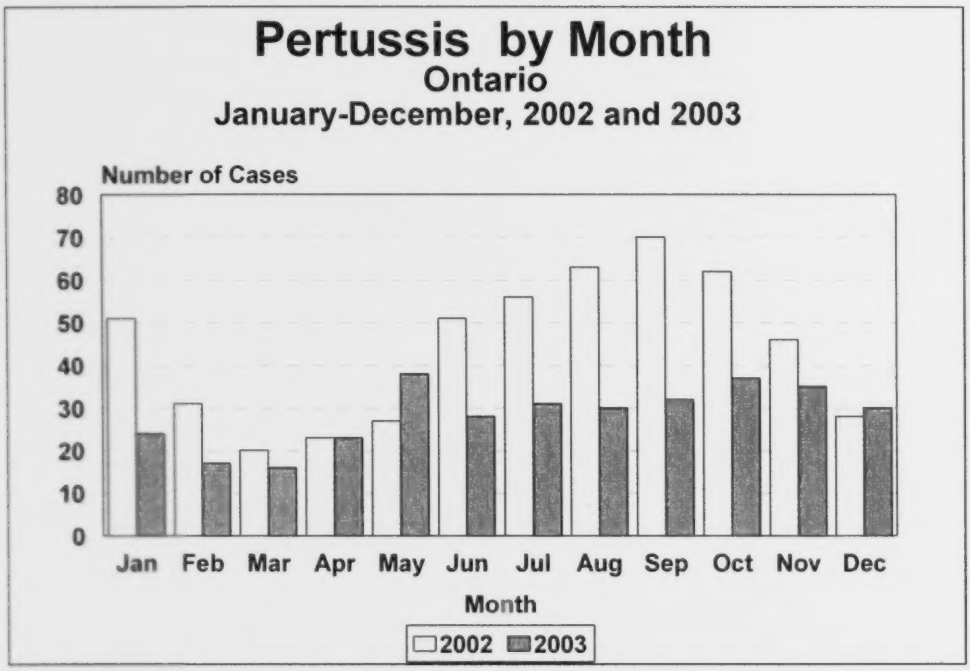
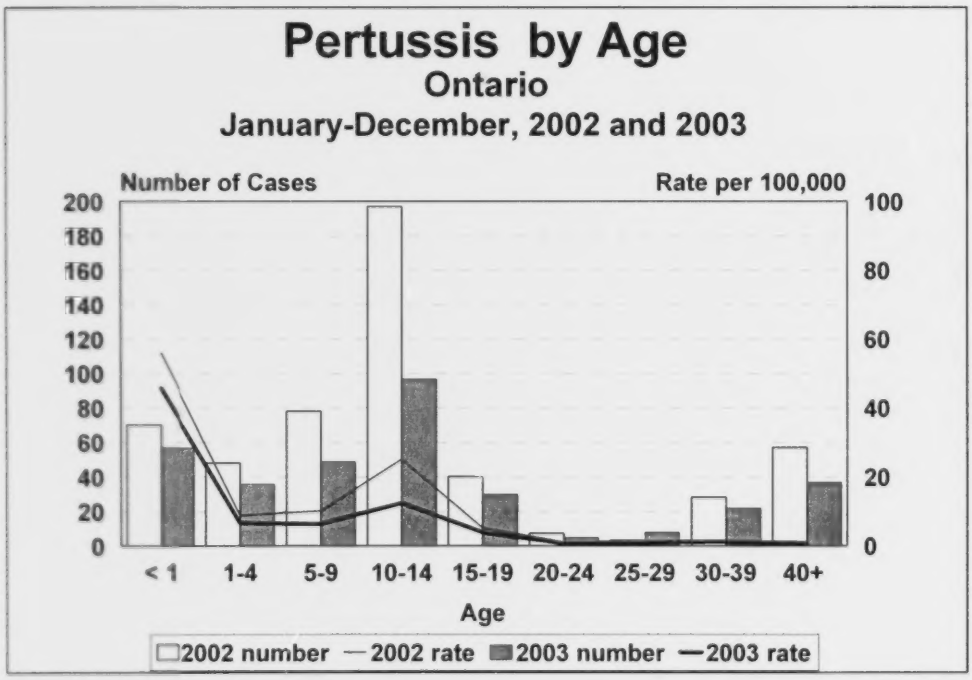
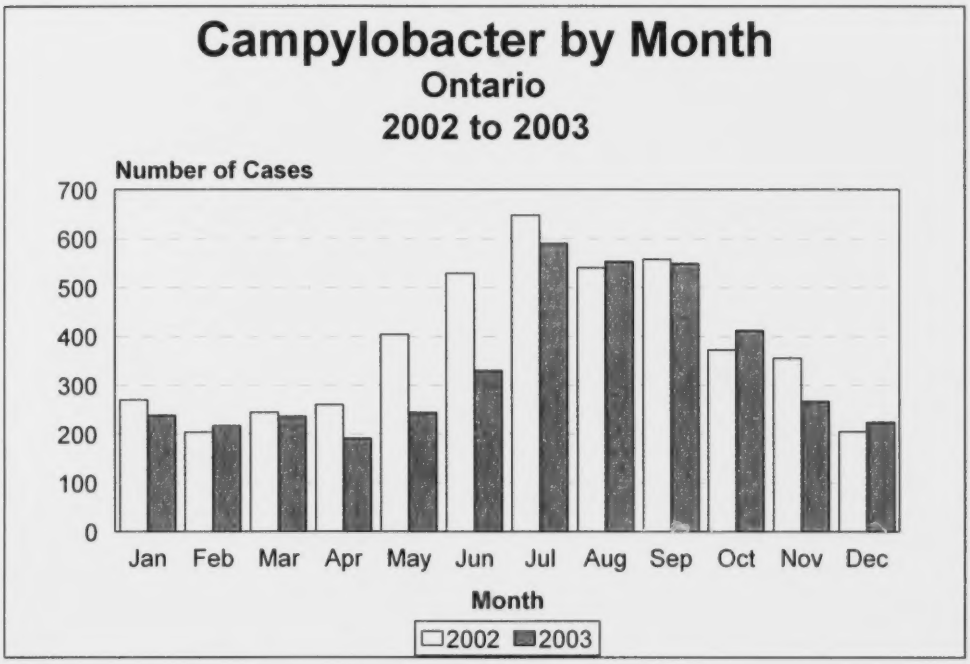
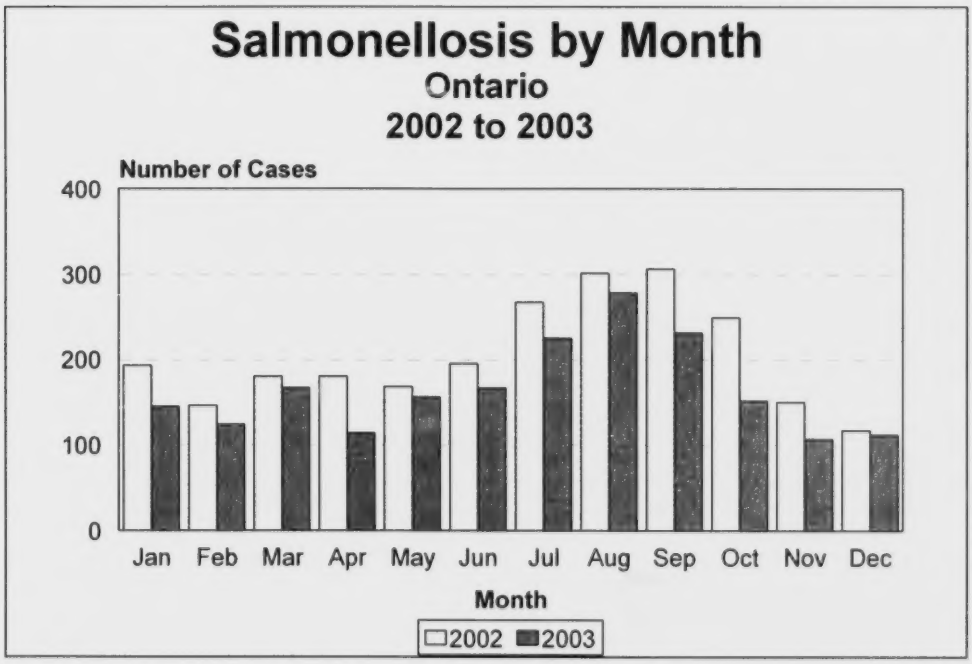


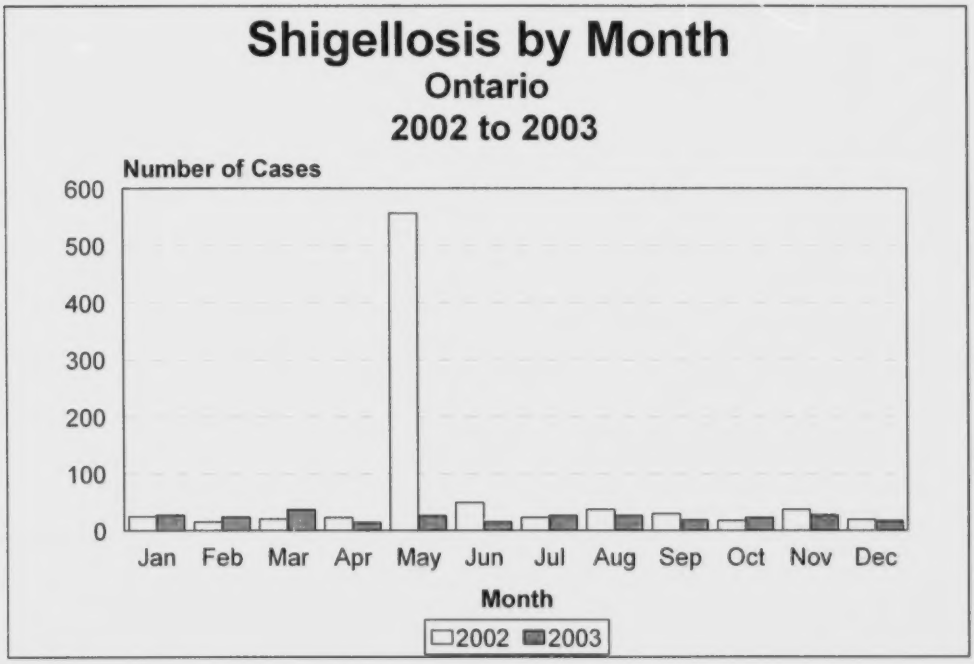


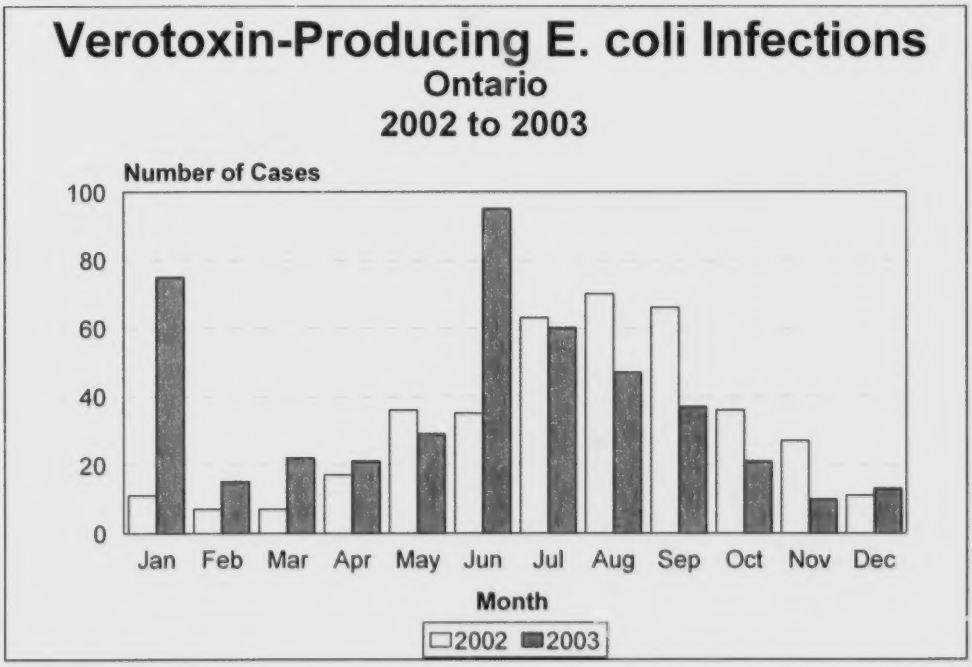
Enteric Diseases





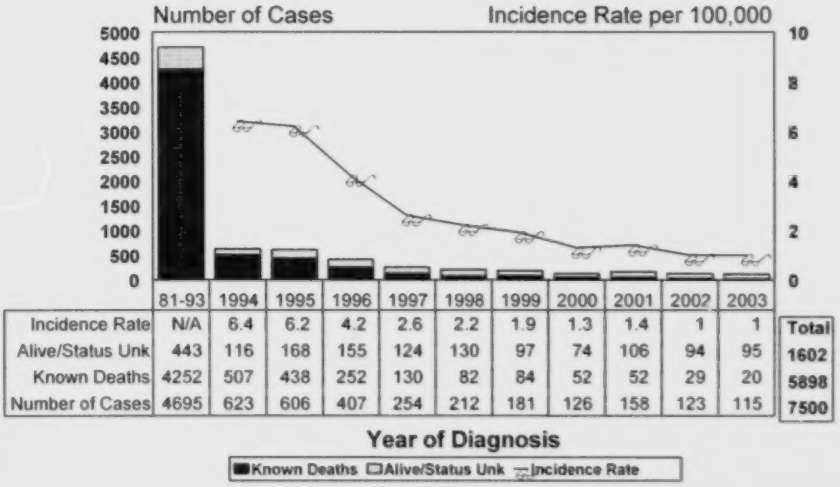
Enteric Diseases (Cont'd)





Sexually Transmitted Diseases

AIDS in Ontario
Incidence by Year of Diagnosis



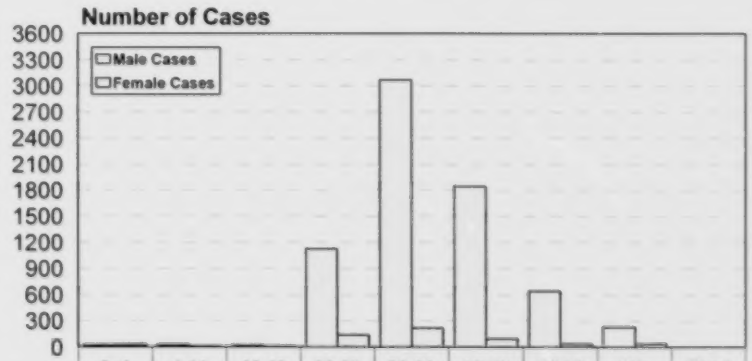
	81-93	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	
Incidence Rate	N/A	6.4	6.2	4.2	2.6	2.2	1.9	1.3	1.4	1	1	Total
Alive/Status Unk	443	116	168	155	124	130	97	74	106	94	95	1602
Known Deaths	4252	507	438	252	130	82	84	52	52	29	20	5898
Number of Cases	4695	623	606	407	254	212	181	126	158	123	115	7500

Year of Diagnosis

Known Deaths Alive/Status Unk Incidence Rate

Ministry of Health and Long-Term Care
Public Health Branch
Cumulative cases diagnosed to December 31, 2003

AIDS in Ontario
Cases by Age and Sex



	0<1	1-14	15-19	20-29	30-39	40-49	50-59	60+	Total
Male Cases	21	22	15	1122	3064	1840	637	228	6949
Female Cases	24	10	5	134	215	96	34	33	551
Total Cases	45	32	20	1256	3279	1936	671	261	7500

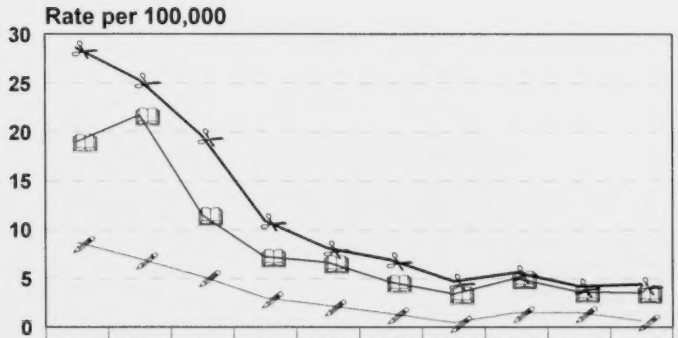
Age Group

Ministry of Health and Long-Term Care
Public Health Branch
Cumulative cases diagnosed to December 31, 2003

Sexually Transmitted Diseases (Cont'd)

Males AIDS Rates for Selected Age Group

Ontario, 1994-2003



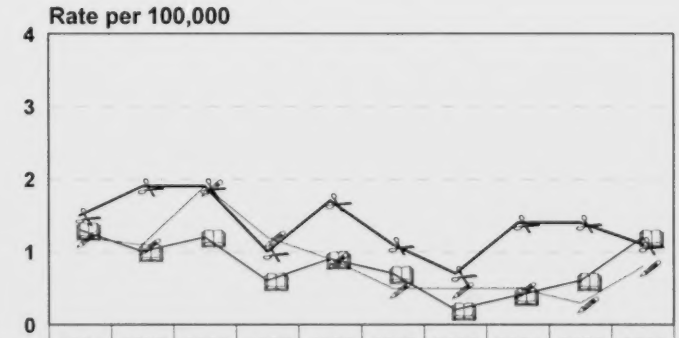
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
20-29 Age Group	8.7	7	5.2	3	2.2	1.4	0.5	1.5	1.5	0.7
30-39 Age Group	28.6	25.3	19.6	10.9	8.1	6.9	4.7	5.6	4.2	4.4
40-49 Age Group	19	21.7	11.5	7.2	6.6	4.6	3.4	5	3.6	3.5

Year of Diagnosis

Ministry of Health and Long-Term Care
Public Health Branch
Cumulative cases diagnosed to December 31, 2003

Females AIDS Rates for Selected Age Group

Ontario, 1993-2003



	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
20-29 Age Group	1.2	1.1	1.9	1.2	0.9	0.5	0.5	0.5	0.3	0.8
30-39 Age Group	1.5	1.9	1.9	1	1.7	1.1	0.7	1.4	1.4	1.1
40-49 Age Group	1.3	1	1.2	0.6	0.9	0.7	0.2	0.4	0.6	1.2

Year of Diagnosis

Ministry of Health and Long-Term Care
Public Health Branch
Cumulative cases diagnosed to December 31, 2003